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BY HAND DELIVERY

Mr. Joel H. Peck, Clerk
State Corporation Commission
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1300 East Main Street
Richmond, Virginia 23219

Application of Virginia Electric and Power Company, To participate in the pilot program for electric power storage batteries pursuant to § 56-585.1:6 of the Code of Virginia, and for certification of a proposed battery energy storage system pursuant to § 56-580 D of the Code of Virginia
Case No. PUR-2019-00124

Dear Mr. Peck:

Please find enclosed for filing in the above-referenced matter, an unbound original and one (1) copy of the public version of the *Virginia Electric and Power Company's Application and Request for Waivers* ("Application"). An extraordinarily sensitive version of the Application is being filed under seal, under separate cover.

In addition, the Company is contemporaneously filing with the Commission, under separate cover, a Motion for Entry of a Protective Order and Additional Protective Treatment in the above-referenced matter.

Please do not hesitate to contact me if you have any questions.

Very truly yours,

Vishwa B. Link

Vishwa B. Link

Enclosures

cc: William H. Chambliss, Esq. (w/o enclosures)
C. Meade Browder, Jr., Esq.
Paul E. Pfeffer, Esq. (w/o enclosures)
Audrey T. Bauhan, Esq. (w/o enclosures)

COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATION OF	)	
	)	
VIRGINIA ELECTRIC AND POWER COMPANY	)	
	)	Case No. PUR-2019-00124
To participate in the pilot program for electric power storage batteries pursuant to § 56-585.1:6 of the Code of Virginia, and for certification of a proposed battery energy storage system pursuant to § 56-580 D of the Code of Virginia	)	

VIRGINIA ELECTRIC AND POWER COMPANY'S APPLICATION AND REQUEST FOR WAIVERS

Pursuant to § 56-585.1:6 of the Code of Virginia ("Va. Code" or "Code"), Rule 80 A of the Rules of Practice and Procedure of the State Corporation Commission of Virginia (the "Commission"), 5 VAC 5-20-80 A, and the Commission's Guidelines Regarding Electric Power Storage Battery Pilot Programs (the "Guidelines"), Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company"), by counsel, hereby files its first application ("Application") to participate in the pilot program for electric power storage batteries (the "Pilot Program"). Through this Application, the Company presents three projects for deployment of battery energy storage systems ("BESS") as part of the Pilot Program: BESS-1: Prevention of Solar Backfeeding; BESS-2: BESS as a Non-Wires Alternative; and BESS-3: Solar Plus Storage.

In addition, to the extent required by the Commission, and pursuant to Va. Code § 56-580 D and the Commission's Filing Requirements in Support of Applications for Authority to Construct and Operate an Electric Generating Facility (the "Generation Rules"), 20 VAC 5-302-10 *et seq*, the Company requests an amended certificate of public convenience and necessity ("CPCN") to construct and operate BESS-3 at the Company's Scott Solar Facility, for which the

Commission granted a CPCN No. ET-206.[1] To facilitate this request, the Company has provided information required by the Generation Rules, but requests waivers of certain of the Generation Rules pursuant to Rule 40, 20 VAC 5-302-40. Specifically, the Company requests a waiver of Rule 25(6)(b) (topographical map), Rule 25(8) (fuel supply arrangement), and Rule 35 (need), and a limited waiver of Rule 25(4) with respect to filing more than one copy of its 2018 Form 10-K.

In support of this Application, the Company states as follows:

GENERAL INFORMATION

1. Dominion Energy Virginia is a public service corporation organized under the laws of the Commonwealth of Virginia furnishing electric service to the public within its certificated service territory. The Company also supplies electric service to non-jurisdictional customers in Virginia and to the public in portions of North Carolina. The Company is engaged in the business of generating, transmitting, distributing, and selling electric power and energy to the public for compensation. The Company also is a public utility under the Federal Power Act, and certain of its operations are subject to the jurisdiction of the Federal Energy Regulatory Commission. The Company is an operating subsidiary of Dominion Energy, Inc.

2. The Company's name and post office address are:

Virginia Electric and Power Company
120 Tredegar Street
Richmond, Virginia 23219

[1] *Application of Virginia Electric and Power Company, For approval and certification for the proposed 2016 Solar Projects pursuant to §§ 56-580 D and 56-46.1 of the Code of Virginia, and approval of a rate adjustment clause, designated Rider US-2, under § 56-585.1 A 6 of the Code of Virginia*, Case No. PUE-2015-00104, Final Order at 15, Ordering Paragraph (1) (Jun. 30, 2016) [hereinafter *Scott Solar CPCN Order*].

3. The names, addresses, and telephone numbers of the attorneys for the Company are:

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STATUTORY AUTHORITY

4. As part of the Grid Transformation and Security Act of 2018 (the "GTSA"), the General Assembly directed the Commission to establish the Pilot Program, a program under which the Company must submit a proposal or proposals to deploy electric power storage batteries.[2] The legislation established the permissible objectives of the Pilot Program; set a maximum size for and duration of the Pilot Program; and addressed cost recovery for BESS deployed under the Pilot Program:

> A proposal shall provide for the deployment of batteries pursuant to a pilot program that accomplishes at least one of the following: (i) improve reliability of electrical transmission or distribution systems; (ii) improve integration of different types of renewable resources; (iii) deferred investment in generation, transmission, or distribution of electricity; (iv) reduced need for additional generation of electricity during times of peak demand; or (v)

[2] Va. Code § 56-585.1:6 A.

> connection to the facilities of a customer receiving generation, transmission, and distribution service from the utility. A Phase I Utility may install batteries with up to 10 megawatts of capacity. A Phase II Utility may install batteries with up to 30 megawatts of capacity. Each pilot program shall have a duration of five years. The pilot program shall provide for the recovery of all reasonable and prudent costs incurred under the pilot program through the electric utility's base rates on a nondiscriminatory basis.[3]

5. The legislation declared the Pilot Program to be in the public interest: "Any pilot program proposed by a Phase I Utility or Phase II Utility that satisfies the requirements of this subsection is in the public interest."[4]

6. The legislation also directed the Commission to establish guidelines for the general administration of the Pilot Program. The Commission issued the Guidelines in November 2018.[5] The Guidelines allow each utility to "file with the Commission one or more applications to participate in the Pilot Program at different times," and set forth the content for such filings.[6]

7. Va. Code § 56-580 D requires a CPCN for electrical generating facilities:

> The Commission shall permit the construction and operation of electrical generating facilities in Virginia upon a finding that such generating facility and associated facilities (i) will have no material adverse effect upon reliability of electric service provided by any regulated public utility, (ii) are required by the public convenience and necessity, if a petition for such permit is filed after July 1, 2007, and if they are to be constructed and operated by any regulated utility whose rates are regulated pursuant to § 56-585.1, and (iii) are not otherwise contrary to the public interest. In review of a petition for a, certificate to construct and operate a generating facility

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[3] *Id.*
[4] *Id.*
[5] *See Commonwealth of Virginia, ex rel. State Corporation* Commission, *Ex Parte: In the matter concerning the implementation by Virginia Electric and Power Company d/b/a Dominion Energy Virginia of a pilot program for the deployment of electric power storage batteries pursuant to Enactment Clause Nos. 9 and 10 of Senate Bill* 966, Case No. PUR-2018-00060, Order Establishing Guidelines at 4 (Nov. 26, 2018).
[6] Guidelines at Section D, E.

> described in this subsection, the Commission shall give consideration to the effect of the facility and associated facilities on the environment and establish such conditions as may be desirable or necessary to minimize adverse environmental impact as provided in § 56-46.1.

8. The Generation Rules apply generally to the construction of electric generating facilities with rated capacities of more than 5 megawatts ("MW"). For facilities with rated capacities of 50 MW or less but greater than 5 MW, Rule 25 applies, 20 VAC 5-302-25.

APPLICATION TO PARTICIPATE IN PILOT PROGRAM

9. In this Application, the Company presents three projects for deployment: BESS-1: Prevention of Solar Backfeeding; BESS-2: BESS as a Non-Wires Alternative; and BESS-3: Solar Plus Storage.

10. Through BESS-1, the Company proposes to deploy a 2 MW / 4 megawatt-hour ("MWh") alternating current ("AC") lithium-ion BESS that will study the prevention of solar backfeeding onto the transmission grid at a specific substation. BESS-1 seeks to accomplish the following objectives from Va. Code § 56-585.1:6 A: (i) improved reliability of electrical transmission or distribution systems; and (ii) improved integration of different types of renewable resources. The projected cost for BESS-1 is approximately $2.9 million, with a projected commercial operation date of December 31, 2020.

11. Through BESS-2, the Company proposes to deploy a 2 MW / 4 MWh AC lithium-ion BESS that will study BESS as a non-wires alternative to reduce transformer loading at a specific substation. BESS-2 seeks to accomplish the following objectives from Va. Code § 56-585.1:6 A: (i) improved reliability of electrical transmission or distribution systems; and (iii) deferred investment in generation, transmission, or distribution of electricity. The projected

cost for BESS-2 is approximately $4.1 million, with a projected commercial operation date of December 31, 2020.

12. Through BESS-3, the Company proposes to deploy a lithium-ion BESS at its Scott Solar Facility consisting of a 2 MW / 8 MWh direct current ("DC")-coupled system and a 10 MW / 40 MWh AC-coupled system. BESS-3 seeks to study solar plus storage, and to accomplish the following objectives from Va. Code § 56-585.1:6 A: (ii) improve integration of renewable resources; and (iv) reduce the need for additional generation during times of peak demand. The projected cost for BESS-3 is approximately $26.1 million, with a projected commercial operation date of December 31, 2020.

13. Details on BESS-1, BESS-2, and BESS-3 are attached to the Application as Exhibits 1, 2, and 3, respectively. These exhibits provide the detailed information on each BESS required by the Guidelines.

14. The Company requests Commission approval for BESS-1, BESS-2, and BESS-3 to participate in the Pilot Program. The three projects seek to accomplish various legislative objectives for BESS deployed through the Pilot Program as described above. Consistent with Va. Code § 56-585.1:6, the Company will include the costs of BESS-1, BESS-2, and BESS-3 in its base rate cost of service for recovery through its rates for generation and distribution services. To the extent permissible, the Company may designate the costs for customer credit reinvestment offset pursuant to Va. Code § 56-585.1 A 8.

15. The Commission has not approved any proposals under the Pilot Program for the Company to date. The aggregate capacity of the proposals included with this Application is 16 MW.

16. To support the projected commercial operation dates for BESS-1, BESS-2, and BESS-3, the Company respectively requests an order granting permission to participate in the Pilot Program by February 2, 2020.[7]

AMENDED CPCN FOR BESS-3[8]

17. The Commission issued CPCN No. ET-206 for the construction and operation of the Scott Solar Facility on June 30, 2016.[9] The Scott Solar Facility went in service in December 2016.

18. The Company seeks to use BESS-3 as a generation asset, paired with Scott Solar Facility. Accordingly, the Company requests an amended CPCN pursuant to Va. Code § 56-580 D and the Generation Rules, to the extent required by the Commission.

19. In addition to the information on BESS-3 provided in Exhibit 3, details on BESS-3 required by statute and the Generation Rules are attached to this Application as Exhibit 4, subject to the waiver requests outlined below.

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[7] Va. Code 56-585.1 A 6 states that "[t]he Commission shall . . . enter its final order with respect to any petition by a utility for a certificate to construct and operate a generating facility or facilities utilizing energy derived from sunlight, pursuant to subsection D of § 56-580, within six months after the date of filing such petition." Because BESS-3 will be connected to the Scott Solar Facility, it is "a generating facility . . . utilizing energy derived from sunlight." Accordingly, the Company's request for an amended CPCN related to BESS-3 appears to qualify for the review to be conducted by the Commission within six months. Since many of the issues that may arise related to the CPCN for BESS-3 could apply to all three BESS, the Company respectfully requests review within the six month period for its application to participate in the Pilot Program for all three BESS. In addition, conclusion of the Commission proceeding within six months supports the commercial operations dates of December 31, 2020, for all three BESS.

[8] The Company is installing BESS-1 and BESS-2 to address ordinary distribution grid operational concerns—solar backfeeding and transformer loading, respectively. Based on these proposed uses and the size of the BESS, the Company considers BESS-1 and BESS-2 to be "ordinary . . . improvements in the usual course of business" under Va. Code 56-265.2 A that do not require a CPCN from the Commission. To the extent the Commission determines that BESS-1 and BESS-2 do not qualify under this exception, the Company respectfully requests a CPCN for BESS-1 and BESS-2.

[9] *See Scott Solar CPCN Order* at 15, Ordering Paragraph (1).

REQUESTS FOR WAIVERS

20. Pursuant to Rule 40 and for good cause shown, the Company requests a waiver of Rule 25(6)(b), Rule 25(8), and Rule 35, and requests a limited waiver of Rule 25(4).[10]

21. The Company request a waiver of the requirement in Rule 25(6)(b) to provide "a depiction on topographic maps of the proposed site" because a topographic map is not available for the site.

22. The Company next requests a waiver of Rule 25(8) requiring a "general description of the fuel supply arrangement for the proposed facility." The fuel source for the proposed BESS-3 is the electricity generated by the Scott Solar Facility, whose fuel source is the sun. Accordingly, this fuel-related requirement is not applicable. The Company requests a waiver of Rule 25(8).

23. The Company requests a waiver of Rule 35, which requires specific information on "the need for the proposed facility." The Company proposes to construct and operate BESS-3 as part of the Pilot Program, the goal of which is to deploy up to 30 MW of electric power storage batteries to study specific objectives of this emerging technology. The General Assembly has declared participation in the Pilot Program to be in the public interest. Therefore, the traditional requirements to justify the "need" for electric generating facilities should be found

[10] Three of the four waiver requests are similar to waivers recently granted by the Commission in Case No. PUR-2019-00105. *Petition of Virginia Electric and Power Company, For approval and certification for the proposed US-4 Solar Project pursuant to §§ 56-580 D and 56-46.1 of the Code of Virginia, and approval of a rate adjustment clause, designated Rider US-4, under § 56-585.1 A 6 of the Code of Virginia*, Case No. PUR-2019-00105, Order for Notice and Hearing at 21, Ordering Paragraphs (21)–(24) (Jul. 31, 2019).

to not be applicable in this circumstance. In addition, the need for the Scott Solar Facility has already been established by the Company, and approved by the Commission.[11]

24. Finally, the Company requests a requests partial waiver of Rule 25(4) to the extent it requires multiple copies of the Company's publicly-available 2018 Form 10-K. Rule 25(4) requires "[f]inancial information for the applicant." "If the applicant . . . is a public company, financial information should include the entity's most recent stockholder report and most recent Securities and Exchange Commission Form 10-K." The Company's financial information is filed publicly with the Securities and Exchange Commission and is available on the Company's website. The Company is filing one copy of its 2018 Form 10-K with the Clerk and providing website links to the publicly-available documents in Exhibit 4. For purposes of judicial economy and environmental consciousness, the Company respectfully requests partial waiver of filing additional copies of its publicly-available 2018 Form 10-K.

WHEREFORE, the Company respectfully requests that the Commission: (i) direct that notice of the Application be given; (ii) grant the Company's requested waivers; (iii) issue an order by February 2, 2020 (a) allowing BESS-1, BESS-2, and BESS-3 to participate in the Pilot Program established under Va. Code § 56-585.1:6; and (b) granting an amended certificate of public convenience and necessity for the construction and operation of BESS-3 under Va. Code § 56-580 D, to the extent required by the Commission; and, (iv) granting such other relief as deemed appropriate and necessary.

[11] *Scott Solar CPCN Order at 8-9* ("We find that the Company has established a need for the additional capacity and energy that the Solar Projects would provide, and that the Projects will assist the Company in diversifying its fuel portfolio.")

Respectfully submitted,

VIRGINIA ELECTRIC AND POWER COMPANY

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August 2, 2019

Application of Virginia Electric and Power Company, To participate in the pilot program for electric power storage batteries pursuant to § 56-585.1:6 of the Code of Virginia, and for certification of a proposed battery energy storage system pursuant to § 56-580 D of the Code of Virginia, **Case No. PUR-2019-00124**

<u>EXHIBIT LIST</u>

Exhibit 1 – BESS-1: Prevention of Solar Generation Backfeeding

Exhibit 2 – BESS-2: Battery Energy Storage System as a Non-Wires Alternative

Exhibit 3 – BESS-3: Solar Plus Storage
    Attachment 1 – Site Layout Plans

Exhibit 4 – Generation Rules
    Attachment 1 – Map of Scott Solar Facility

Exhibit 1

Electric Power Storage Battery Pilot Program
Proposal Summary

Proposal: BESS-1 – Prevention of Solar Generation Backfeeding

I. Location. The utility shall provide the location where the utility proposes to install the BESS. If the utility proposes to install a BESS at a customer premises, the utility shall provide the name and address of the customer, a description of the arrangement with the customer allowing collocation on the customer's property, and a description of the proposed ownership of the BESS.

The proposed BESS will be installed at the Company's Correctional Substation located in New Kent County, Virginia, near Barhamsville, on Company-owned property. This location was chosen because it has a feeder with 20 megawatts ("MW") of solar photovoltaic ("PV") generation interconnected that frequently results in backfeeding (also known as "reverse flow") to the transmission network. In addition, the substation has sufficient free space available for the BESS without requiring expansion of the existing substation footprint.

II. Capacity. The utility shall provide the capacity of the proposed BESS and the aggregate capacity of all proposals approved by the Commission under the Pilot Program for the utility.

The Company proposes to install a 2 MW / 4 megawatt-hour ("MWh") alternating current ("AC")-coupled BESS. The Commission has not approved any proposals under the Pilot Program to date; however, the aggregate capacity of the proposals included with this Application is 16 MW.

III. Technology. The utility shall specify the proposed BESS technology and the manner in which the BESS will be or has been procured.

The proposed BESS will utilize lithium ion technology. Most energy storage technologies have shown differential cost declines in recent years, with lithium ion technologies leading the way due to the technological improvements and increased manufacturing capacity. Lithium ion batteries have high energy density, low self-discharge, and high round-trip efficiency, which make them good candidates for grid-connected stationary storage.

The BESS is being procured using a competitive bidding, request for proposal ("RFP") process that requires a fixed price engineering, procurement, and construction ("EPC") contract. The Company used the same RFP process for both proposed distribution projects, BESS-1 and BESS-2. The RFP specified that the BESS technology shall meet all requirements of UL 1973 – *Standard for Safety Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail Applications* and UL 9540 – *Standard for Energy Storage Systems and Equipment.* In addition, the RFP specified that the bidder shall also submit the test reports for the proposed battery technology consistent with UL 9540a – *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.*

Eighteen (18) vendors were invited to submit proposals, of which eight (8) provided responses. Each proposal was then reviewed for conformity with the technical and business requirements of the RFP.

IV. **In-Service Date. The utility shall provide the expected date on which the proposed BESS will be placed into service. The in-service date shall serve as the start date for the BESS as part of the Pilot Program. The proposed BESS will be in service for five years unless the utility has provided notice to repurpose or retire the BESS. Each proposal shall include an explanation by the utility for any proposed use of the BESS beyond the five-year duration of the Pilot Program.**

The Company anticipates that the proposed BESS will be in service by December 31, 2020, based upon Commission approval on or before February 2, 2020.

The Company will determine the best use of the BESS after the five-year duration of the Pilot Program based on the performance of the BESS and the information learned from the BESS during the course of the Pilot Program. At this time, the Company anticipates that it will continue to use the BESS for backfeeding prevention, assuming that it remains physically capable of further operation. The Company may also explore other uses, such as voltage regulation, peak shaving, phase balancing, and harmonics mitigation depending on the BESS's capabilities at the end of the Pilot Program.

V. **Useful Life and Decommissioning. The utility shall provide the projected useful life of the proposed BESS, including known or projected performance degradation and proposed plan for decommissioning at the end of its useful life.**

The projected useful life of the proposed BESS is ten (10) years.

All batteries will experience some degradation over the course of their lives based on time in service, usage profile (*i.e.*, how frequently it is used, and for what duration), and aggregate energy discharged. The EPC contractor is required to guarantee the nameplate capacity identified above in Section II for five (5) years.

Decommissioning of the proposed BESS will take place once the system has reached the end of its useful life ("EOL"). The decommissioning costs have been included in the projected costs.

Lithium-ion battery elements include metals such as copper, aluminum, iron, and lithium. The following is a list of steps and considerations that will be performed to prepare and implement a decommissioning plan that complies with applicable laws, regulations, and other site-specific conditions:

- Identify system components to be decommissioned (*e.g.*, battery system, power control system ("PCS"), transformer, thermal management HVAC unit).
- Where possible, discharge batteries to the lowest state of charge ("SOC") possible before disconnection, transportation, recycling, and disposal.

- Procure tools and equipment necessary to support decommissioning of the system (*e.g.*, fork-lift rental for removal of batteries and racks).
- Remove and package battery racks or battery modules with appropriate dangerous goods (hazardous material) labels for shipment.
- Use certified carrier to transport batteries to vendor for disposal.
- Recycle batteries with authorized recyclers, who will provide certificates of recycling and disposal, including any recycling of other miscellaneous materials.

The EOL decommissioning will be performed by trained and qualified technical resources to reduce the risk of electrical or chemical hazards.

VI. Cost. The utility shall provide the projected installation cost of the proposed BESS and a detailed analysis of the projected operation and maintenance ("O&M") cost associated with the proposed BESS. This shall include an appropriate cost metric for evaluation based on the proposed objective(s) of the BESS.

The total cost for BESS-1 is expected to be approximately $2.9 million (excluding financing costs), as detailed in Figure 1 below. This equates to $1,440/kW or $720/kWh. Annual O&M costs are shown in Figure 1 below. These costs also include projected costs for monitoring, analytics, and reporting.

Figure 1: BESS-1 Cost Breakdown

[EXTRAORDINARILY SENSITIVE INFORMATION REDACTED]

Description	**Cost (1,000s)**
BESS Equipment	[redacted]
Installation/Commissioning	
Site work/engineering*	
Subtotal	
Contingency (4%)	
Total	**$2,881**

Decommissioning/recycling**	[redacted]
Annual O&M	

* This includes engineering studies, site work, and auxiliary equipment needed to install the BESS, which are being provided by the Company.

** Decommissioning is included in the cost of the BESS, however the Company is responsible for paying shipping and handling costs to transport the system back to the vendor at end of life.

VII. Asset Classification. The utility shall indicate its preferred classification of the proposed BESS as a generation, transmission, or distribution asset.

The BESS will be classified as a distribution asset.

VIII. Objective. The utility shall specify the objective(s) that the specific proposal will seek to accomplish, including a description of how the specific proposal will accomplish the stated objective(s). Permissible objectives, as listed in Enactment Clause No. 9, include: (i) improved reliability of electrical transmission or distribution systems; (ii) improved integration of different types of renewable resources; (iii) deferred investment in generation, transmission, or distribution of electricity; (iv) reduced need for additional generation of electricity during times of peak demand; or (v) connection to the facilities of a customer receiving generation, transmission, and distribution service from the utility.

The proposed BESS-1 seeks to accomplish the following objectives: (i) improved reliability of electrical transmission or distribution systems; and, (ii) improved integration of different types of renewable resources.

The widespread addition of distributed generation ("DG") sources like solar PV to the distribution grid presents both opportunities and challenges. Customers can reduce both their environmental impact (by producing carbon-free energy) and their electrical bills (via net metering). Coupled with storage, they can also have a source of backup power during extended outages. Likewise, utilities can purchase their customers' excess PV generation and sell it to other customers, improving integration of renewable resources to the grid.

At the same time, however, DG causes the power grid to operate in a way for which it was not originally designed. For most of the electrical age, energy has traveled in a single direction: from large generators to transmission lines, then to the distribution system, and finally to customers, much like traffic on a one-way street. DG changes the "one-way street" into a "two-way street" by making it possible for energy to flow in reverse from the customer back to the transmission grid when the DG output exceeds the load on the circuit. This introduces several potential issues that a BESS could help mitigate:

- **Reduction of transformer loading** – On a lightly loaded distribution feeder with large amounts of DG, it is possible for there to be enough generation that the amount of backfed power exceeds the substation transformer rating. This phenomenon has previously been observed in the Company's service territory. Excessive backfeeding causes heating of the transformer windings, and could potentially damage the device or decrease its useable life. A BESS can absorb the excess energy so that DG production does not need to be curtailed.
- **Improper voltage regulation** – The Company is required to maintain the voltage that customers receive within certain limits. Normally, voltage decreases along the circuit with increasing distance from the substation because of the inherent resistance of the wires. The reduction in voltage is directly proportional to the amount of current flowing through the circuit, and can be mitigated with voltage control devices (*e.g.*, load tap

changers ("LTCs") and capacitors). DG reduces the amount of current being sent from the substation, which decreases voltage drop along the circuit. Voltage control devices at the substation may try to raise the circuit's voltage unnecessarily because they do not have visibility into how much DG is present at any given time, and are thus unaware of the increased voltages further down the line. This creates wear and tear on these devices (resulting in increased maintenance), and could potentially lead to power quality issues for customers. A BESS can be used to help control voltage on the circuit, decreasing the need to operate LTCs and capacitors and preserving their useful life.

The Company's Correctional Substation serves a 20 MW solar farm that experiences backfeeding more than 1,100 hours per year, resulting in 5,847 MWh of energy being supplied to the transmission system. A load-duration curve using hourly average data from the substation transformer serving this solar farm, which became operational in October 2017, is given in **Figure 2** below.[1] As shown in the figure, the amount of backfeeding reaches a maximum of about 16 MW (shown as a negative value on the chart).

Figure 2: Load-Duration Curve for Correctional Substation TX-1

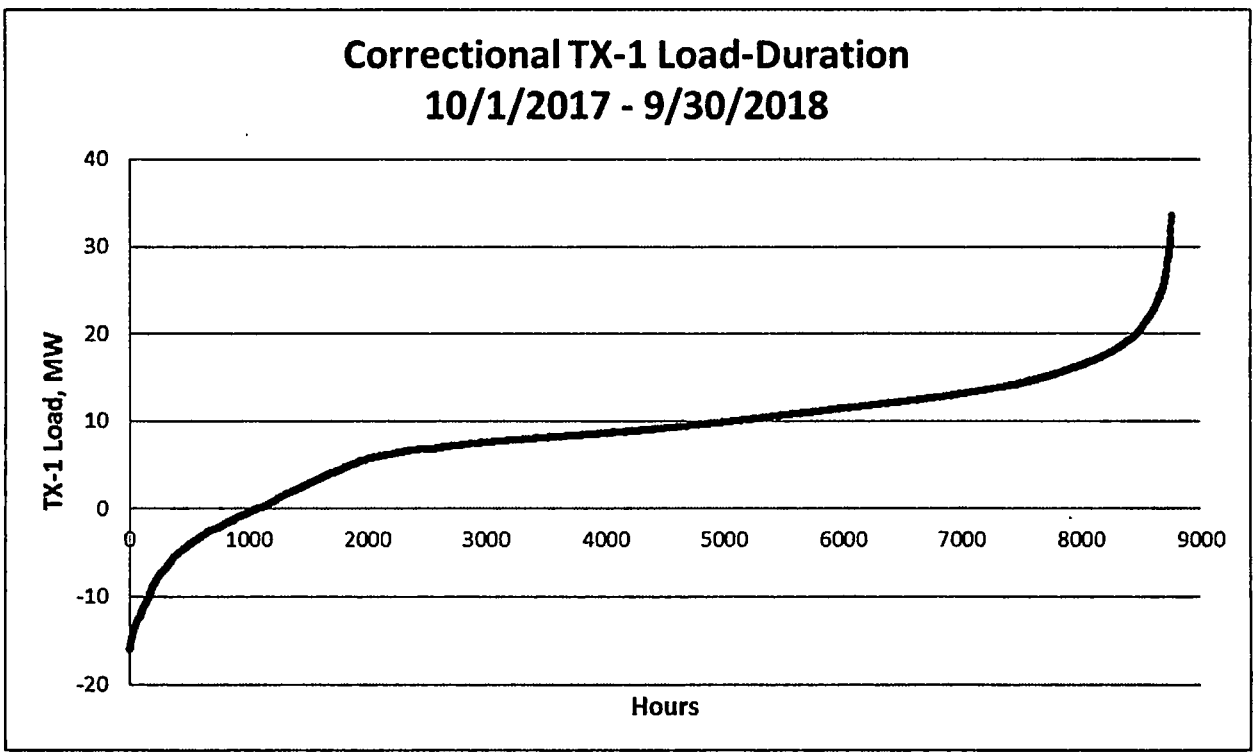
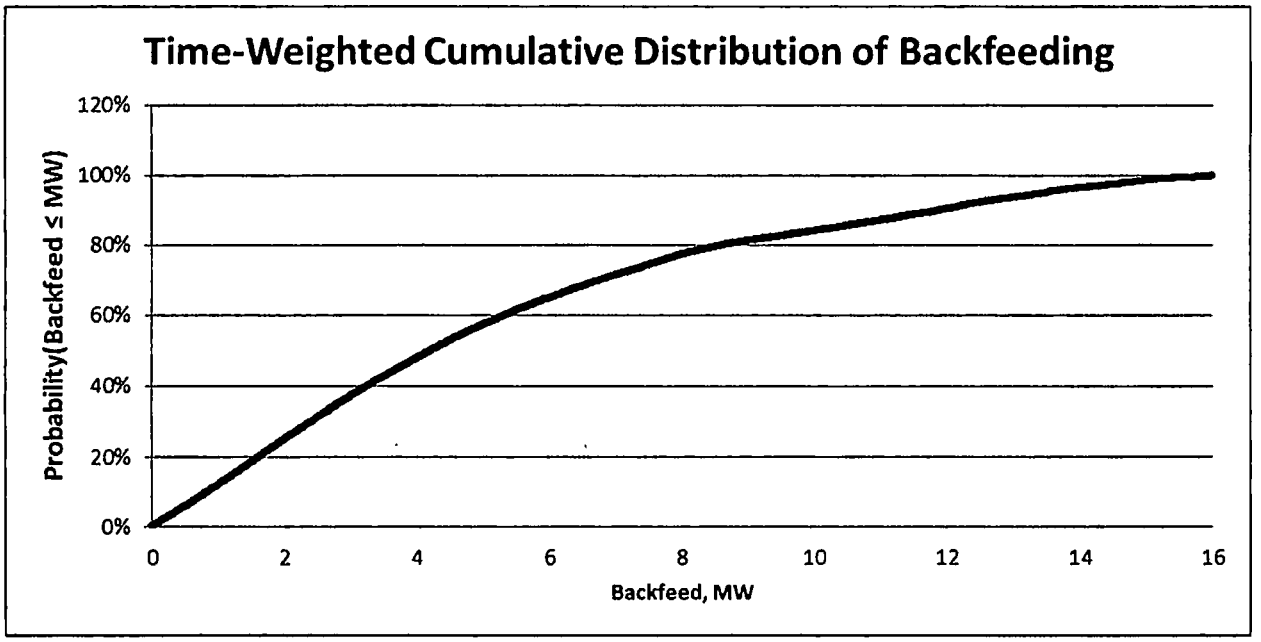


Figure 3 provides a graphical representation of the probability that the amount of backfeeding on the circuit will fall within a given range. This is known as the *cumulative distribution function*, or CDF. For example, it shows that about 25% of the backfeeding that occurs (in terms of time) is less than 2 MW. Thus, even a relatively small 2 MW battery can contribute to eliminating periods of reverse flow through the transformer if it is operated correctly.

[1] In this figure, negative values of transformer load represent backfeeding.

Figure 3: Cumulative Distribution Function for Correctional Substation TX-1 Backfeeding



This pilot project aims to use the BESS-1 to alleviate some of the issues caused by the integration of renewable resources. Although the size of the proposed BESS may not be sufficient to completely eliminate backfeeding of energy to the transmission system at all times, the knowledge and experience gained from using it for this particular application is still extremely valuable. The lessons learned will then allow the Company to safely and successfully deploy battery energy storage in the future as this technology becomes more widespread within the electric utility industry.

IX. <u>Metrics and Performance Data</u>. The utility shall provide the initial metrics that will be used to determine if the proposed BESS is meeting the objective(s) that the proposal seeks to accomplish. Initial metrics may include performance and operational safety metrics.

The following metrics will be used to evaluate the performance of the BESS:

Avoided hours / MWh of backfeeding – Data obtained from the period preceding installation of the BESS can be used as a baseline or control variable, which can be compared to data collected after the device has been in service.

Reduced capacitor bank / load tap changer operations – The number of device operations in the year before the BESS is installed can be compared with those in the same time period afterwards.

Round-trip efficiency – All battery storage systems experience losses. These can result from inefficiencies in the conversion of AC to direct current ("DC") or vice-versa, heating/cooling

systems needed to keep the BESS within the proper temperature range, and from losses incurred by electronics used to monitor and manage the battery cells. Efficiency can be calculated by comparing the amount of energy released by the BESS to that which it consumes during charging. In addition, the efficiency can be monitored over time to examine if it changes significantly as the BESS ages.

Durability – The storage capacity of batteries declines with use. This degradation is a function of multiple factors, including the services that the BESS provides, how often it charges/discharges, depth of charge, etc. Degradation will be monitored and reported over time to determine if it is consistent with expected operations.

Availability – Availability of the BESS will be measured by comparing the amount of time that the BESS is available for operations to the total amount of time in the study period, which will be compared to industry expected levels of approximately 98%.

Electric Power Storage Battery Pilot Program
Proposal Summary

Proposal: BESS-2 – Battery Energy Storage System as a Non-Wires Alternative

I. Location. The utility shall provide the location where the utility proposes to install the BESS. If the utility proposes to install a BESS at a customer premises, the utility shall provide the name and address of the customer, a description of the arrangement with the customer allowing collocation on the customer's property, and a description of the proposed ownership of the BESS.

The proposed BESS will be installed at the Company's Hanover Substation located in Ashland, Virginia, on Company-owned property. This location was chosen because a substation step-down transformer is expected to exceed its top nameplate rating during peak load conditions in the coming years, as discussed in Section VIII.

II. Capacity. The utility shall provide the capacity of the proposed BESS and the aggregate capacity of all proposals approved by the Commission under the Pilot Program for the utility.

The Company proposes to install a 2 megawatt ("MW") / 4 megawatt-hour ("MWh") alternating current ("AC")-coupled BESS. The Commission has not approved any proposals under the Pilot Program to date; however, the aggregate capacity of the proposals included with this Application is 16 MW.

III. Technology. The utility shall specify the proposed BESS technology and the manner in which the BESS will be or has been procured.

The proposed BESS will utilize lithium ion technology. Most energy storage technologies have shown differential cost declines in recent years, with lithium ion technologies leading the way due to the technological improvements and increased manufacturing capacity. Lithium ion batteries have high energy density, low self-discharge, and high round-trip efficiency, which make them good candidates for grid-connected stationary storage.

The BESS is being procured using a competitive bidding, request for proposal ("RFP") process that requires a fixed price engineering, procurement, and construction ("EPC") contract. The Company used the same RFP process for both proposed distribution projects, BESS-1 and BESS-2. The RFP specified that the BESS technology shall meet all requirements of UL 1973 – *Standard for Safety Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail Applications* and UL 9540 – *Standard for Energy Storage Systems and Equipment*. In addition, the RFP specified that the bidder shall also submit the test reports for the proposed battery technology consistent with UL 9540a – *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems*.

Eighteen (18) vendors were invited to submit proposals, of which eight (8) provided responses. Each proposal was then reviewed for conformity with the technical and business requirements of the RFP.

IV. **In-Service Date. The utility shall provide the expected date on which the proposed BESS will be placed into service. The in-service date shall serve as the start date for the BESS as part of the Pilot Program. The proposed BESS will be in service for five years unless the utility has provided notice to repurpose or retire the BESS. Each proposal shall include an explanation by the utility for any proposed use of the BESS beyond the five-year duration of the Pilot Program.**

The Company anticipates that the proposed BESS will be in service by December 31, 2020, based upon Commission approval on or before February 2, 2020.

The Company will determine the best use of the BESS after the five-year duration of the Pilot Program based on the performance of the BESS and the information learned from the BESS during the course of the Pilot Program. At this time, the Company anticipates that it will continue to use the BESS for decreasing transformer loading, assuming that it remains physically capable of further operation. The Company may also explore other uses, such as voltage control and frequency response, depending on the BESS's capabilities at the end of the Pilot Program.

V. **Useful Life and Decommissioning. The utility shall provide the projected useful life of the proposed BESS, including known or projected performance degradation and proposed plan for decommissioning at the end of its useful life.**

The projected useful life of the proposed BESS is ten (10) years.

All batteries will experience some degradation over the course of their lives based on time in service, usage profile (*i.e.*, how frequently it is used, and for what duration), and aggregate energy discharged. The EPC contractor is required to guarantee the nameplate capacity identified above in Section II for five (5) years.

Decommissioning of the proposed BESS will take place once the system has reached the end of its useful life ("EOL"). The decommissioning costs have been included in the projected costs.

Lithium-ion battery elements include metals such as copper, aluminum, iron, and lithium. The following is a list of steps and considerations that will be performed to prepare and implement a decommissioning plan that complies with applicable laws, regulations, and other site-specific conditions:

- Identify system components to be decommissioned (*e.g.*, battery system, power control system ("PCS"), transformer, thermal management HVAC unit).
- Where possible, discharge batteries to the lowest state of charge ("SOC") possible before transportation, recycling, and disposal.
- Procure tools and equipment necessary to support decommissioning of the system (*e.g.*, fork-lift rental for removal of batteries and racks).

- Remove and package battery racks or battery modules with appropriate dangerous goods (hazardous material) labels for shipment.
- Use certified carrier to transport batteries to vendor for disposal.
- Recycle batteries with authorized recyclers, who will provide certificates of recycling and disposal, including any recycling of other miscellaneous materials.

The EOL decommissioning will be performed by trained and qualified technical resources to reduce the risk of electrical or chemical hazards.

VI. Cost. **The utility shall provide the projected installation cost of the proposed BESS and a detailed analysis of the projected operation and maintenance ("O&M") cost associated with the proposed BESS. This shall include an appropriate cost metric for evaluation based on the proposed objective(s) of the BESS.**

The total cost for BESS-2 is expected to be approximately $4.1 million (excluding financing costs), as detailed in Figure 1 below. This equates to $2,046/kW or $1,023/kWh. Annual operations and maintenance ("O&M") costs are shown in Figure 1 below. These costs also include projected costs for monitoring, analytics, and reporting.

Figure 1: BESS-2 Cost Breakdown

[EXTRAORDINARILY SENSITIVE INFORMATION REDACTED]

Description	**Cost (1,000s)**
BESS Equipment	[redacted]
Installation/Commissioning	
Site work/engineering*	
Subtotal	
Contingency (4%)	
Total	**$4,093**

Decommissioning/recycling**	[redacted]
Annual O&M	

* This includes engineering studies, site work, and auxiliary equipment needed to install the BESS, which are being provided by the Company.

** Decommissioning is included in the cost of the BESS, however the Company is responsible for paying shipping and handling costs to transport the system back to the vendor at end of life.

VII. Asset Classification. The utility shall indicate its preferred classification of the proposed BESS as a generation, transmission, or distribution asset.

The BESS will be classified as a distribution asset.

VIII. Objective. The utility shall specify the objective(s) that the specific proposal will seek to accomplish, including a description of how the specific proposal will accomplish the stated objective(s). Permissible objectives, as listed in Enactment Clause No. 9, include: (i) improved reliability of electrical transmission or distribution systems; (ii) improved integration of different types of renewable resources; (iii) deferred investment in generation, transmission, or distribution of electricity; (iv) reduced need for additional generation of electricity during times of peak demand; or (v) connection to the facilities of a customer receiving generation, transmission, and distribution service from the utility.

The proposed BESS-2 seeks to accomplish the following objectives: (i) improved reliability of electrical transmission or distribution systems and (iii) deferred investment in generation, transmission, or distribution of electricity.

Distribution circuits are supplied by substation transformers that convert the high transmission voltages used for bulk power transmission to lower distribution voltages that are more suitable for delivering electricity to customers. These substation transformers are thermally rated according to the amount of apparent power (*i.e.*, the geometric sum of real and reactive power, typically expressed in megavolt amperes ("MVA") for large transformers) that can be transmitted through them without causing damage to the device. Loading the transformer beyond the rating causes it to overheat, which degrades the winding insulation (*i.e.*, electrically non-conductive material that prevents short circuits within the device) and decreases its usable life.

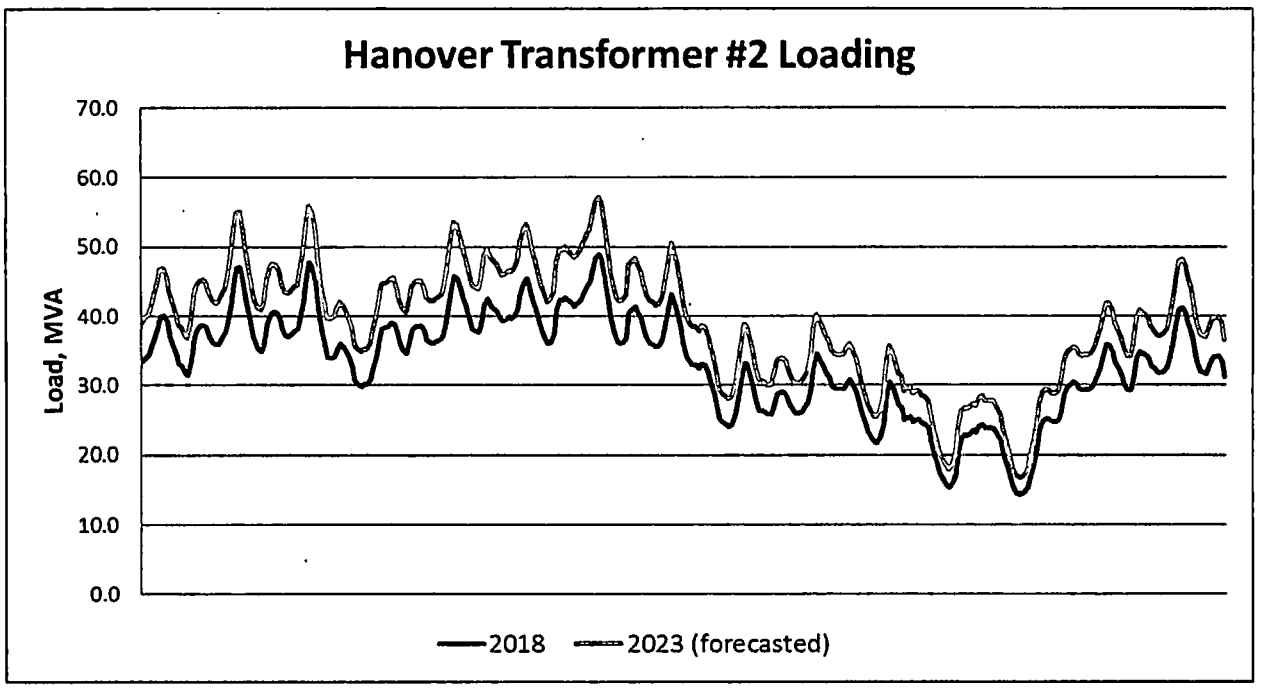
Transformer failures present both safety and reliability risks. An overheated transformer can explode, potentially starting fires, damaging property, and injuring nearby personnel. Customers served by the transformer will experience an outage until remedial actions can be performed. In some cases, it may not be possible to switch customers to an alternate feeder, meaning that they will be without power for an extended period of time. In addition, transformers are very expensive to replace, a cost that is passed on to customers. Thus, avoiding transformer thermal overloading is highly desirable.

Although distribution system planners can typically predict and plan for transformer replacements several years in advance, unforeseen increases in load can result in the need for transformers to be upgraded ahead of schedule. Alternatively, a utility can use non-wires alternatives ("NWAs") to avoid replacing the transformer. As defined by Navigant Research, non-wires alternatives are "an electricity grid investment or project that uses non-traditional [transmission and distribution ("T&D")] solutions, such as distributed generation, energy storage, energy efficiency demand response, and grid software and controls, to defer or replace the need for specific equipment upgrades, such as T&D lines or transformers, by reducing load at

a substation or circuit level."[1] In this case, the BESS will function as an NWA by reducing some of the load on the transformer and delaying its replacement.

For this pilot project, the Company chose the 50 MVA Transformer #2 located at Hanover Substation. The maximum load observed on the unit in 2018 was 49 MVA (as shown in **Figure 3**), which occurred for a few hours in January of that year. Internal load projections indicate that the load is to reach 57 MVA by 2023.

Figure 2: Hanover TX2 Loading, 1/1/2018 – 1/15/2018



Installing a 2 MW BESS on the circuit would reduce the transformer loading during these brief periods, which could allow the replacement of the transformer to be deferred for perhaps a few more years. Although the power capacity of the BESS is indeed smaller[2] than the forecasted 7 MVA overload, it is important to remember that a transformer can be safely overloaded to some extent under certain conditions. The adjusted rating depends on the ambient temperature and loading history. Specifically, previous periods of moderate loading under cooler temperatures allow for more loading without causing any damage, while previous periods of heavy loads under hotter temperatures allow for less.

In this case, the contingency winter normal overload rating for the transformer at the temperature experienced during the peak is 69.2 MVA. While this may appear to be large enough to preclude

[1] https://www.utilitydive.com/news/non-wires-alternatives-whats-up-next-in-utility-business-model-evolution/446933/

[2] MW and MVA are generally not interchangeable units, though they are related to each other as mentioned above. In this case, however, at the substation transformer, the amount of reactive power in the load is so small that the MW and MVA measurements are essentially the same.

the need for the BESS, in practice, this level of loading would not be acceptable under continuous normal circumstances because some capacity needs to be reserved for other contingencies (*e.g.*, switching additional load from another circuit onto the transformer during an emergency). In addition, because this is a pilot project that is testing relatively new technology, it would not be prudent to rely entirely upon the BESS to avoid completely overloading the transformer since the BESS could experience an unexpected failure that would make it unavailable for use. The overload rating thus allows a safety margin to ensure that the transformer is never put at risk because of a problem with the battery.

Rather, the main benefit provided by the BESS-2 pilot is the knowledge and experience gained from using the BESS for this particular application. The lessons learned will then allow the Company to safely and successfully deploy battery energy storage in the future as this technology becomes more widespread within the electric utility industry.

IX. <u>Metrics and Performance Data</u>. The utility shall provide the initial metrics that will be used to determine if the proposed BESS is meeting the objective(s) that the proposal seeks to accomplish. Initial metrics may include performance and operational safety metrics.

The following metrics can be used to evaluate the performance of the BESS:

Avoided overload energy – This metric will quantify how much energy the BESS supplies during periods of peak load. It can then be compared to historical transformer loading data to assess the benefits provided by the BESS.

Round-trip efficiency – All battery storage systems experience losses. These can result from inefficiencies in the conversion of AC to direct current ("DC") or vice-versa, heating/cooling systems needed to keep the BESS within the proper temperature range, and from losses incurred by electronics used to monitor and manage the battery cells. Efficiency can be calculated by comparing the amount of energy released by the BESS to that which it consumes during charging. In addition, the efficiency can be monitored over time to examine if it changes significantly as the BESS ages.

Durability – The storage capacity of batteries declines with use. This degradation is a function of multiple factors, including the services that the BESS provides, how often it charges/discharges, depth of charge, etc. Degradation will be monitored and reported over time to determine if it is consistent with expected operations.

Availability – Availability of the BESS will be measured by comparing the amount of time that the BESS is available for operations to the total amount of time in the study period, which will be compared to industry expected levels of approximately 98%.

Electric Power Storage Battery Pilot Program
Proposal Summary

Proposal: BESS-3 – Solar Plus Storage

I. Location. The utility shall provide the location where the utility proposes to install the BESS. If the utility proposes to install a BESS at a customer premises, the utility shall provide the name and address of the customer, a description of the arrangement with the customer allowing collocation on the customer's property, and a description of the proposed ownership of the BESS.

The proposed BESS will be owned by Dominion Energy and installed at the Scott Solar Facility located at 4325 Old Buckingham Road, Powhatan, Virginia. The Company has leased this property under a sublease agreement with Virginia Solar Land Holding LLC dated March 18, 2016. An initial thirty-five (35) year lease was executed with the right to extend the term for up to an additional twenty (20) years. This location was chosen because of the availability of space within the site to locate the BESS. This location was also chosen because of the size of the Scott Solar Facility, which can demonstrate battery performance on the entire facility for peak shifting and demonstrate a representative inverter block size for direct current ("DC") clipping. Site layout plans for BESS-3 are shown in Attachment 1.

II. Capacity. The utility shall provide the capacity of the proposed BESS and the aggregate capacity of all proposals approved by the Commission under the Pilot Program for the utility.

The Company proposes to install a 12 megawatt ("MW") BESS at this location, consisting of a 2 MW / 8 megawatt-hour ("MWh") direct current ("DC")-coupled system and a 10 MW / 40 MWh alternating current ("AC")-coupled system. The Commission has not approved any proposals under the Pilot Program for the Company to date; however, the aggregate capacity of the proposals included with this Application is 16 MW.

III. Technology. The utility shall specify the proposed BESS technology and the manner in which the BESS will be or has been procured.

The proposed BESS will utilize lithium ion technology. Most energy storage technologies have shown differential cost declines in recent years, with lithium ion technologies leading the way due to the technological improvements and increased manufacturing capacity. Lithium ion batteries have high energy density, low self-discharge, and high round-trip efficiency, which make them good candidates for grid-connected stationary storage.

The BESS is being procured using a competitive bidding, request for proposal ("RFP") process that requires a fixed price engineering, procurement, and construction ("EPC") contract. The RFP specified the following approved battery suppliers for the proposed BESS: (i) BYD; (ii) CATL; (iii) LG Chem; (iv) Tesla/Panasonic. EPC contractor bidders were free to propose alternate suppliers, but acceptance of non-approved suppliers is at the discretion of the Company. The RFP also specified that the BESS technology shall meet all requirements of UL 1973 –

Standard for Safety Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail Applications and UL 9540 – *Standard for Energy Storage Systems and Equipment.* In addition, the RFP specified that the bidder shall also submit the test reports for the proposed battery technology consistent with UL 9540a – *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems.*

Four contractors have provided responses which are under technical and commercial review with the contract award expected by the end of third quarter 2019.

IV. <u>In-Service Date</u>. The utility shall provide the expected date on which the proposed BESS will be placed into service. The in-service date shall serve as the start date for the BESS as part of the Pilot Program. The proposed BESS will be in service for five years unless the utility has provided notice to repurpose or retire the BESS. Each proposal shall include an explanation by the utility for any proposed use of the BESS beyond the five-year duration of the Pilot Program.

The Company anticipates the proposed BESS will be in service by year end 2020 based on Commission approval on or before February 2, 2020.

The Company will determine the best use of the BESS after the five-year duration of the Pilot Program based on the performance of the BESS and the information learned from the BESS during the course of the Pilot Program, as well as market economics at the end of the Pilot Program. The Company will seek any required authority for use of BESS after the Pilot Program as appropriate.

V. <u>Useful Life and Decommissioning</u>. The utility shall provide the projected useful life of the proposed BESS, including known or projected performance degradation and proposed plan for decommissioning at the end of its useful life.

The projected useful life of the proposed BESS is ten (10) years.

All batteries will experience some degradation over the course of their lives based on time in service, usage profile (*i.e.*, how frequently it is used, and for what duration), and aggregate energy discharged. The EPC contractor is required to guarantee the nameplate capacity identified above in Section II for the useful life.

Decommissioning of the proposed BESS will take place once the system has reached the end of its useful life ("EOL"). The decommissioning costs have been included in the projected cost.

Lithium-ion battery elements include metals such as copper, aluminum, iron, and lithium. The following is a list of steps and considerations that will be performed to prepare and implement a decommissioning plan that complies with applicable laws, regulations, and other site-specific conditions:

- Identify system components to be decommissioned (*e.g.*, battery system, power control system ("PCS"), transformer, thermal management HVAC unit).

- Where possible, discharge batteries to the lowest state of charge ("SOC") possible before disconnection, transportation, recycling, and disposal.
- Procure tools and equipment necessary to support decommissioning of the system (*e.g.*, fork-lift rental for removal of batteries and racks).
- Remove and package battery racks or battery modules with appropriate dangerous goods (hazardous material) labels for shipment.
- Use certified carrier to transport batteries to vendor for disposal.
- Recycle batteries with authorized recyclers, who will to provide certificates of recycling and disposal, including any recycling of other miscellaneous materials.

The EOL decommissioning will be performed by trained and qualified technical resources to reduce the risk of electrical or chemical hazards.

VI. Cost. The utility shall provide the projected installation cost of the proposed BESS and a detailed analysis of the projected operation and maintenance ("O&M") cost associated with the proposed BESS. This shall include an appropriate cost metric for evaluation based on the proposed objective(s) of the BESS.

The total cost for BESS-3 is expected to be $26.1 million (excluding financing costs) as detailed in Figure 1 below. This equates to $2,175.9/kW or $543.9/kWh. O&M costs are shown in Figure 1 below.

Figure 1: BESS-3 Cost Breakdown

[EXTRAORDINARILY SENSITIVE INFORMATION REDACTED]

Description	Cost (1,000s)
BESS Equipment	[redacted]
Engineering	
Construction	
Balance of Plant Equipment	
Project Management	
Subtotal	
Contingency	
Total	**$26,111**

Decommissioning	[redacted]
Annual O&M	

VII. Asset Classification. The utility shall indicate its preferred classification of the proposed BESS as a generation, transmission, or distribution asset.

The BESS will be classified as a generation asset.

VIII. Objective. The utility shall specify the objective(s) that the specific proposal will seek to accomplish, including a description of how the specific proposal will accomplish the stated objective(s). Permissible objectives, as listed in Enactment Clause No. 9, include: (i) improved reliability of electrical transmission or distribution systems; (ii) improved integration of different types of renewable resources; (iii) deferred investment in generation, transmission, or distribution of electricity; (iv) reduced need for additional generation of electricity during times of peak demand; or (v) connection to the facilities of a customer receiving generation, transmission, and distribution service from the utility.

The proposed BESS-3 seeks to accomplish the following objectives: (ii) improve integration of renewable resources; and (iv) reduce the need for additional generation during times of peak demand.

The AC-tied system will allow the facility to participate in energy optimization by storing energy generated from photovoltaic ("PV") solar panels during periods of higher production and discharging during periods of lower production. The system can be optimized to provide stored energy during peak load periods or during periods of low irradiance (such as variations in weather during the day) ("Peak Shifting"). The system will be "behind the meter" at Scott Solar Facility, and therefore will function as a load reducer.

The DC-tied system will store PV generation that would otherwise be clipped due to max output limitation on the solar inverter ("Clipping"). The BESS will store the energy, which would otherwise be lost, to be discharged at a later hour, increasing total generation from the solar facility.

IX. Metrics and Performance Data. The utility shall provide the initial metrics that will be used to determine if the proposed BESS is meeting the objective(s) that the proposal seeks to accomplish. Initial metrics may include performance and operational safety metrics.

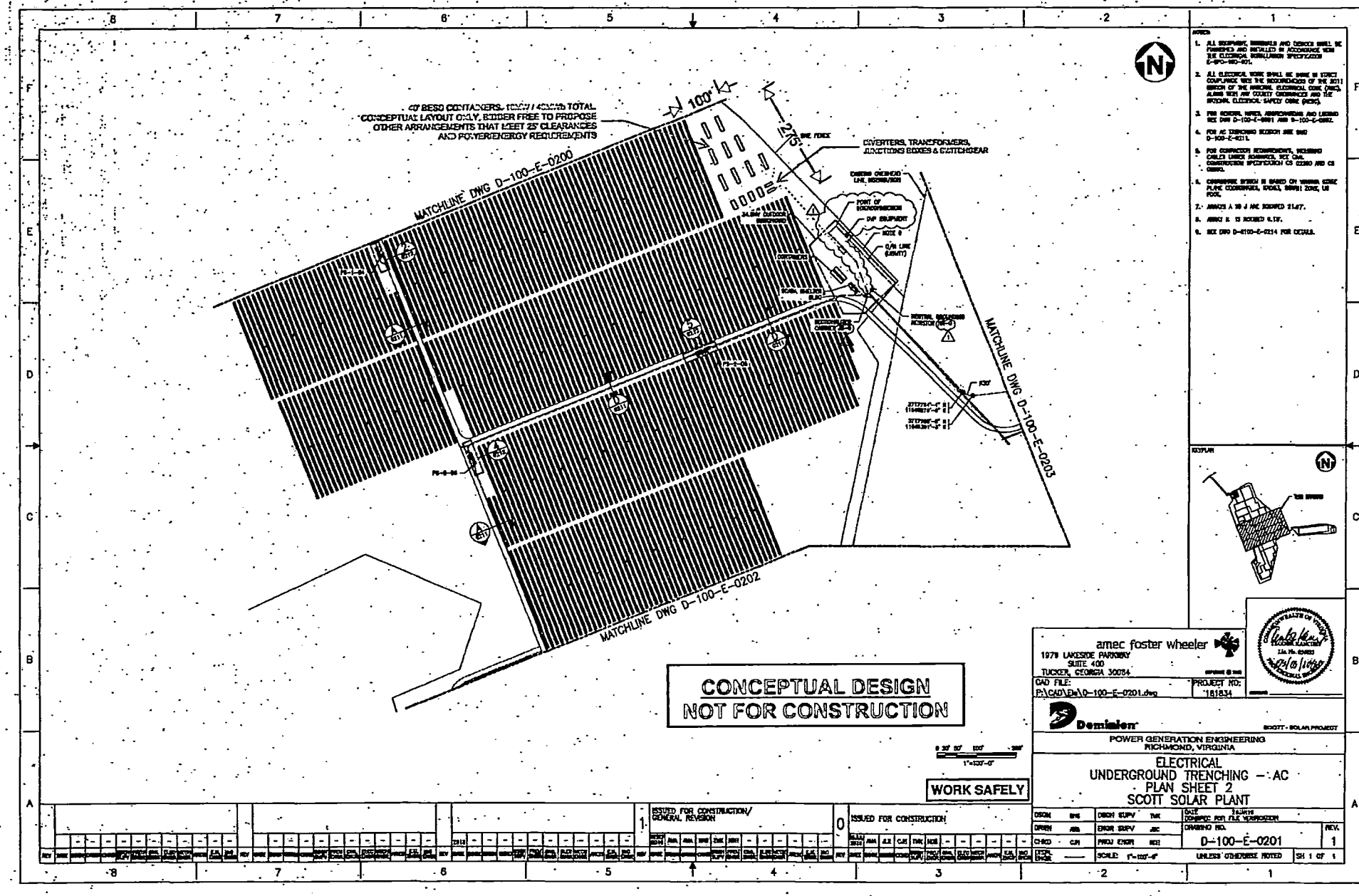
The following metrics will be used to evaluate the performance of the BESS:

Discharge/charge efficiency – The DC-coupled portion of the BESS will capture the solar inverter clipping losses and redistribute during peak demand times. Similarly, the AC-coupled portion of the BESS will store renewable solar energy from the Scott Solar Facility and shift it to correlate with a peak demand need. The ability to perform this Peak Shifting or Clipping function will be measured and reported to confirm reliable and repeatable operations.

Round-trip efficiency – All battery storage systems experience losses. These can result from inefficiencies in the conversion of AC to DC or vice-versa, heating/cooling systems needed to keep the BESS within the proper temperature range, and from losses incurred by electronics used to monitor and manage the battery cells. Efficiency can be calculated by comparing the amount of energy released by the BESS to that which it consumes during charging. In addition, the efficiency can be monitored over time to examine if it changes significantly as the BESS ages.

Durability – The storage capacity of batteries declines with use. This degradation is a function of multiple factors, including the services that the BESS provides, how often it charges/discharges, depth of charge, etc. Degradation will be monitored and reported over time to determine if it is consistent with expected operations.

Availability – Availability of the BESS will be measured by comparing the amount of time that the BESS is available for operations to the total amount of time in the study period, which will be compared to industry expected levels of approximately 98%.



amec foster wheeler
1979 LAKESIDE PARKWAY
SUITE 400
TUCKER, GEORGIA 30084

CAD FILE: P:\CAD\Pe\D-100-E-0201.dwg
PROJECT NO: 181834

Dominion
SCOTT - SOLAR PROJECT
POWER GENERATION ENGINEERING
RICHMOND, VIRGINIA

ELECTRICAL
UNDERGROUND TRENCHING - AC
PLAN SHEET 2
SCOTT SOLAR PLANT

DRAWING NO. D-100-E-0201 REV. 1
SCALE: 1"=100'-0" UNLESS OTHERWISE NOTED
SH 1 OF 1

1 ISSUED FOR CONSTRUCTION/ GENERAL REVISION
0 ISSUED FOR CONSTRUCTION

Attachment 1 to Exhibit 3
Page 1 of 2

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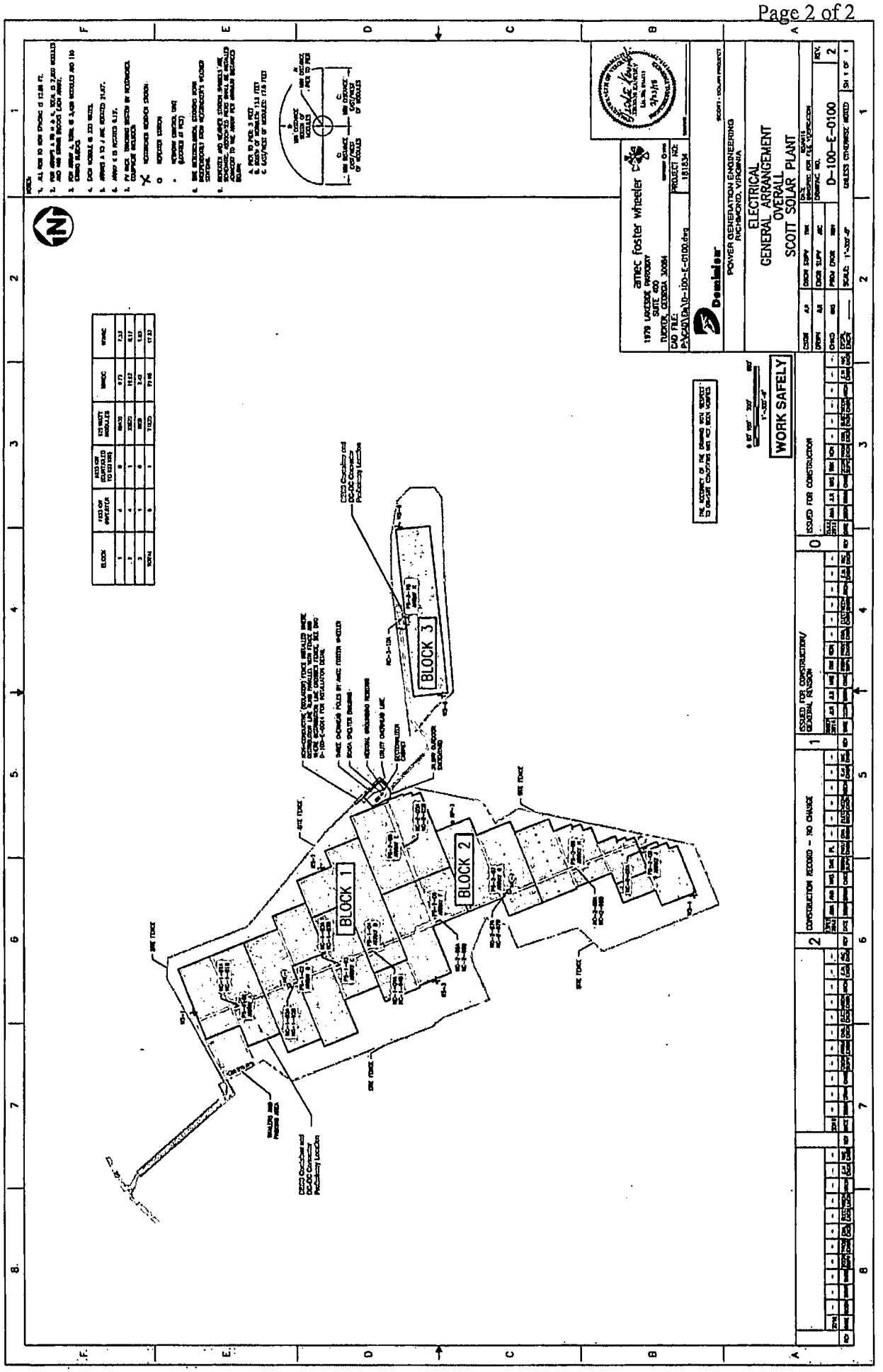

BLOCK 1
BLOCK 2
BLOCK 3
WORK SAFELY
ELECTRICAL
GENERAL ARRANGEMENT
OVERALL
SCOTT SOLAR PLANT
D-100-E-0100
POWER GENERATION ENGINEERING
RICHMOND, VIRGINIA
amec foster wheeler
ISSUED FOR CONSTRUCTION
CONSTRUCTION RECORD - NO CHANGE

Exhibit 4

Legal and Trade Names and Description of Authorized Business Structure of Virginia Electric and Power Company 20 VAC 5-302-25(1) and (2)

Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company") is a public service corporation, which was incorporated in Virginia in 1909. The Company's current legal name is Virginia Electric and Power Company, and it uses the following trade names: Virginia Power, Dominion Energy Virginia, Dominion Virginia Power, Dominion Virginia, Dominion Energy North Carolina, Dominion North Carolina, Dominion North Carolina Power, North Carolina Power, Dominion Generation, and West Virginia Power.

Principal Corporate Officers / Directors of Virginia Electric and Power Company 20 VAC 5-302-25(3)

Thomas F. Farrell, II
Chairman and Chief Executive Officer
120 Tredegar Street
Richmond, VA 23219

Robert M. Blue
Director, President and Chief Operating Officer – Power Delivery Group
120 Tredegar Street
Richmond, VA 23219

Carlos M. Brown
Director, Senior Vice President and General Counsel
120 Tredegar Street
Richmond, VA 23219

Paul D. Koonce
President and Chief Operating Officer – Power Generation Group
120 Tredegar Street
Richmond, VA 23219

James R. Chapman
Executive Vice President, Chief Financial Officer and Treasurer
120 Tredegar Street
Richmond, VA 23219

Carter M. Reid
Executive Vice President, Chief Administrative & Compliance Officer and Corporate Secretary
120 Tredegar Street
Richmond, VA 23219

Edward H. Baine
Senior Vice President – Distribution
120 Tredegar Street
Richmond, VA 23219

Gerald T. Bischof
Senior Vice President – Nuclear Operations & Fleet Performance
5000 Dominion Boulevard
Glen Allen, VA 23060

Katheryn B. Curtis
Senior Vice President – Generation
5000 Dominion Boulevard
Glen Allen, VA 23060

William L. Murray
Senior Vice President – Corporate Affairs & Communications
120 Tredegar Street
Richmond, VA 23219

Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
5000 Dominion Boulevard
Glen Allen, VA 23060

Thomas P. Wohlfarth
Senior Vice President – Regulatory Affairs
120 Tredegar Street
Richmond, VA 23219

Michele L. Cardiff
Vice President, Controller and Chief Accounting Officer
701 East Cary Street
Richmond, VA 23219

Virginia Electric and Power Company Financial Information and Qualifications to Construct and Operate the Proposed Facilities 20 VAC 5-302-25(4) and (5); 20 VAC 5-302-10, Par. I(ii)

One copy of the most recent Form 10-K for Virginia Electric and Power Company has been filed with the Clerk (20 VAC 5-302-25(4)). The 2018 Form 10-K filed February 28, 2019, with the U.S. Securities and Exchange Commission is publicly available at the following website: https://investors.dominionenergy.com/financial-information/sec-filings.

See page 38 to 40 of the Form 10-K for a list of other generation facilities developed or owned and operated by the Company as of December 31, 2018 (20 VAC 5- 302-25(5)(a)). A description of the Company's organization structure is provided on pages 8 to 9 and Exhibit 21 of the Form 10-K. Virginia Electric and Power Company is an incumbent electric utility as defined in Va. Code § 56-576 (20 VAC 5-302-25(5)(b)).

Specific Site Information for the Proposed Facility
20 VAC 5-302-25(6)

The proposed BESS-3 ("Project") will be installed at the Company's Scott Solar Facility located at 4325 Old Buckingham Road in Powhatan, Virginia. The Company has leased this 165-acre property under a sublease agreement with Virginia Solar Land Holding LLC dated March 18, 2016. An initial thirty-five (35) year lease was executed with the right to extend the term for up to an additional twenty (20) years. A map showing the Scott Solar Facility is included as Attachment 1.

General Description of the Proposed Facility
20 VAC 5-302-25(7); 20 VAC 5-302-10, Par. I(i)

The Company proposes to install a 12 MW lithium-ion BESS at this location, consisting of a 2 MW / 8 MWh DC-coupled system and a 10 MW / 40 MWh AC-coupled system. The AC-coupled system will be connected to the 34.5 kV bus inside a new junction box. The DC-coupled system will be connected on the DC side of the existing solar inverters and will be distributed equally among two inverters at the site (1 MW / 4MWh at each inverter location).

Economic Development Impacts of the Proposed Facility
20 VAC 5-302-25(9); 20 VAC 5-302-10, Par. I(iii)

During development and construction, the proposed BESS will provide direct and indirect economic benefits to the Commonwealth. Additionally, local and state tax revenues will incrementally increase as a result of the proposed BESS.

Other Agency Requirements
20 VAC 5-302-25(10)

The Company may need the local and environmental permits listed in the table below. Additional permits or amended permits may be necessary.

Permit	General Description	Administering Entity
General Virginia Pollution Discharge Elimination System ("VPDES") Stormwater VAR10	Water quality and quantity impacts associated with project construction	Department of Environmental Quality [if applicable]

Permit	General Description	Administering Entity
Sediment and Erosion Control Plan Approval and Land Disturbance Permit	Stormwater Pollution Prevention Plan for associated with managing stormwater runoff	Powhatan County [if applicable]
Tier I Spill Prevention, Control and Countermeasure Plan ("SPCC")	Plan to prevent, prepare for and respond to spills	Environmental Protection Agency [if applicable]

Environmental Impacts of the Proposed Facility
Va. Code § 56-580 D; 20 VAC 5-302-25(11); 20 VAC 5-302-10, Par. I(iii)

A key component in the selection of the site was the ability to minimize overall environmental impacts. The Company and the Department of Environmental Quality ("DEQ") conducted a detailed review of the site as part of the certificate of public convenience and necessity ("CPCN") process for the Scott Solar Facility in Case No. PUE-2015-00104. Because the Company is installing the proposed BESS at the Scott Solar Facility, and because reducing the overall environmental impact of the proposed BESS has been given a high priority throughout design, impacts to environmental resources, natural resources, historic resources and scenic assets from the facility will not occur or will be reasonably minimized.

(a) Air Quality

As a battery storage project to support a solar electric generating facility, no impacts to air quality are expected.

(b) Water Source

It is expected that water requirements for the Project will be very minimal.

(c) Discharge of Water

No process water will be generated by the Project.

Stormwater discharges during the construction of the Project will be addressed through the implementation of both an Erosion and Sediment ("E&S") Control Plan and a Stormwater Pollution Prevention Plan ("SWPPP") in compliance with Department of Environmental Quality ("DEQ") regulations and approved by Powhatan County. Stormwater runoff generated during operation of the Project will not qualify as industrial stormwater and will be controlled in accordance with local regulations using approved stormwater best management practices ("BMPs").

(d) Tidal and Non-Tidal Wetlands

The Company will be able to reliably use a wetland and stream delineation conducted as part of the CPCN process for the Scott Solar Facility and confirmed by the U.S. Army Corps of Engineers ("USACE") to avoid impacts to state or federal jurisdictional waters and/or wetlands. In the event that impacts are unavoidable, the Company will apply for and obtain either a Virginia Water Protection General Permit from DEQ or an appropriate Nationwide General Permit(s) from the USACE.

The Company will prepare and implement an E&S Control Plan and a SWPPP in accordance with DEQ regulations and approved by Powhatan County during proposed construction activities to avoid and minimize impacts to wetlands.

(e) Solid and Hazardous Waste

Any solid and/or hazardous wastes generated by the Project will be minimized and reduced at the source, re-used, or recycled to the extent possible. Construction equipment will be operated and maintained to prevent any fuel or oil spills in accordance with the SWPPP and the Spill Prevention, Control, and Countermeasures ("SPCC") Plan. Any waste created by the construction crews will be disposed of in an environmentally responsible manner and recycled where appropriate. In the unlikely event that subsurface waste, hazardous waste, or abandoned petroleum tanks are encountered during excavation, the DEQ Regional Office and the Department of Emergency Services will be contacted immediately.

Minor amounts of solid wastes may be produced as a result of construction activities; however, all solid or hazardous wastes will be handled in accordance with applicable environmental regulations. Accordingly, no impact to local water resources is expected.

Prior to the construction of the existing Scott Solar Facility, a database search was conducted to identify solid and hazardous waste sites within the vicinity of the proposed power station. For Powhatan County, the search found no solid or hazardous waste facilities listed within the search parameters of the Phase I Environmental Site Assessment. The database search also did not find any Comprehensive Environmental Response, Compensation, and Liability Information System sites or Voluntary Remediation Program sites within the vicinity of the proposed facility.

A Phase I Environmental Site Assessment dated July 2015 by Timmons Group did not identify Recognized Environmental Conditions at the site.

(f) Natural Heritage Resources, Threatened, and Endangered Species

The Project is not expected to result in adverse impacts to Natural Heritage Resources ("NHR") which are defined under § 10.1-209 of the Code of Virginia as the habitat of rare, threatened, or endangered plant and animal species, rare or state significant natural communities or geologic sites, and similar features of scientific interest benefiting the welfare of the citizens of the Commonwealth.

As part of the CPCN process for the Scott Solar Facility, coordination with State agencies determined that the project would not result in adverse impacts to natural heritage resources (*i.e.*, threatened or endangered animal and plant species; wildlife; and agricultural, recreational, forest, and mineral resources). Therefore, the Company does not believe that the construction of the BESS within the existing facility will have an adverse impact to natural heritage resources. Moreover, the project will be located within an existing solar facility and therefore, there is no suitable habitat that could potentially support populations of threatened and endangered species.

A review of the Department of Game and Inland Fisheries' Northern Long Eared Bat Maternity Roost and Hibernacula map shows that there are no known roost trees or hibernacula within the Scott Solar Facility. Additionally, no tree clearing will occur, as the BESS will be located within the limits of the operational Scott Solar Facility, so no adverse impacts are anticipated to populations of the Northern Long Eared Bat.

(g) Erosion and Sediment Control

The Company will submit a construction stormwater general permit registration statement to DEQ for review and approval. An E&S permit application and control plan will also be submitted to Powhatan County. The E&S Control Plan will be prepared in accordance with DEQ requirements. A SWPPP will also be completed in accordance with regulations. These specifications will be provided to the Company's contractors for compliance and will be in place prior to the start of construction. All requirements of the approved E&S Control Plan and Stormwater Management Plan will be adhered to throughout construction until permanent site stabilization is achieved.

(h) Archaeological, Historic, Scenic, Cultural, or Architectural Resources

Archaeological, historic, scenic, cultural, or architectural resources are not expected to be impacted by construction or operation of the proposed BESS.

As part of the permitting process for the Scott Solar Facility, archaeological and architectural surveys were conducted and submitted to the Virginia Department of Historic Resources ("DHR"). Archaeological, historic, scenic, cultural, or architectural resources are not expected to be impacted by construction or operation of BESS. Review of files at the DHR determined that no historic properties or cultural resources of significance have been identified within the limits of disturbance associated with the BESS.

Additionally, in the unlikely event that archeological resources are encountered during ground disturbing activities associated with the Project, all ground disturbance will cease in the area of the discovery and DHR will be contacted immediately.

(i) Chesapeake Bay Preservation Areas

No portions of Powhatan County are located within the Tidewater Areas of Virginia and therefore, the Project is not subject to the requirements of the Chesapeake Bay Preservation Act.

(j) Wildlife Resources

The Project will be located within the fenced boundaries of the Scott Solar Facility to prevent access by wildlife. The Company does not anticipate impacts to wildlife resources associated with the facility.

(k) Recreation, Agricultural, and Forest Resources

Prior to the construction of the existing Scott Solar Facility, the Company coordinated with the Virginia Department of Conservation and Recreation's Division of Planning and Recreation Resources (the "Division") to identify existing or planned recreational resources within or adjacent to the Scott Solar facility. Based upon the due diligence completed, the Division did not identify any existing or planned recreational resources within or adjacent to the proposed facility that would be adversely impacted.

Prior to the construction of the existing Scott Solar Facility, the Company coordinated with the Virginia Department of Agriculture and Consumer Services to identify any protected agricultural lands within or adjacent to the Scott Solar facility. Based upon the research and assessments performed to date, there are no protected agricultural lands within or adjacent to the proposed facility that will be adversely affected.

The Company will coordinate with the Virginia Department of Forestry as needed to identify any existing or planned forest resources within or adjacent to the Project.

(l) Use of Pesticides and Herbicides

The Company typically utilizes selective, low volume applications of EPA approved, non-restricted use herbicides for landscape maintenance. "Selective" application means the Company sprays only the undesirable plant species (as opposed to broadcast applications). "Low volume" application means the Company uses only the volume of herbicide necessary to remove the selected plant species as recommended by the manufacturer. These herbicides are manually applied by certified Applicators. The least toxic pesticides are applied to targeted species in accordance with the principles of integrated pest management. Only herbicides approved for aquatic use by the EPA and the U.S. Fish and Wildlife Service will be used in or around any surface water.

(m) Geology and Mineral Resources

Detailed subsurface geotechnical borings and assessments have been performed at strategic locations throughout the site in support of the existing Scott Solar Facility. The results of these geotechnical assessments will be used by the construction contractor to determine appropriate construction methods and techniques.

There are no known caves or sinkholes present on the site. Because of the site's location, discovery of unknown caves or sinkholes is unlikely given that these types of features are

primarily located in regions of Virginia underlain with limestone and dolomite. These geologic conditions are more common in the Valley and Ridge of Virginia.

During the permitting process for the Scott Solar Facility, a review of the Virginia Department of Mines, Minerals, and Energy's ("DMME's") database of mine locations revealed that there are no mines located within a two (2) mile radius of the Scott Solar Facility, and none within the site limits. As part of the project development, excavation or disturbance at depth will be limited. If marketable deposits of mineral resources, such as sand and gravel, are located on the property, these deposits will not be disturbed. Following decommissioning of the Project, access to these resources would be available.

The Company will coordinate with DMME as needed to identify locations of known mineral resources and all existing or planned mineral extraction projects within the immediate vicinity of the Project.

(n) Transportation Infrastructure

As part of the due diligence for the Scott Solar Facility, the Company coordinated with the Virginia Department of Transportation ("VDOT") regarding potential effects to current and projected state highways. The installation of the BESS is not anticipated to affect state highways.

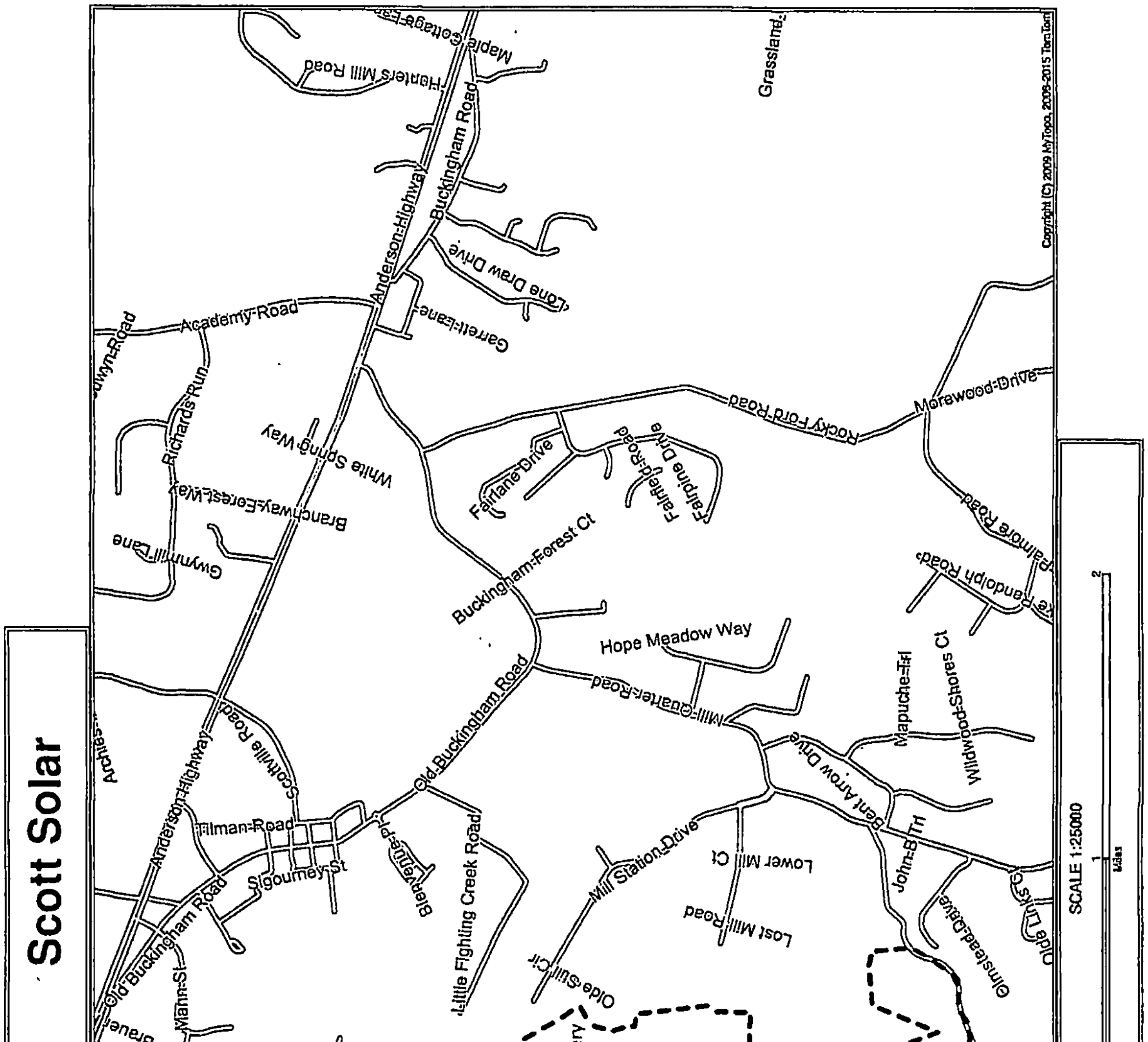
If required by Powhatan County, the Company will prepare and submit a construction traffic management plan (as part of the overall site development plan) to VDOT for review and approval.

Transmission Reliability Impacts of the Proposed Facility
Va. Code § 56-580 D (i); 20 VAC 5-302-25(12); 20 VAC 5-302-10, Par. I(iv)

BESS-3 should have no impact to transmission reliability because the Scott Solar Facility is interconnected to a radial distribution circuit (*i.e.*, Powhatan Circuit 405). Additionally, the proposed BESS will be connected behind the Scott Solar main breaker. The Small Generator Interconnection Agreement for the Scott Solar Facility requires the use of a direct transfer trip ("DTT") protection scheme, which by design will remove the solar and battery generation from the distribution circuit when the main breaker or intermediate line recloser opens.

Public Interest of the Proposed Facility
Va. Code § 56-580 D (iii); 20 VAC 5-302-25(13); 20 VAC 5-302-10, Par. I(v)

The proposed BESS is declared by statute to be in the public interest because it satisfies the requirements of Va. Code § 56-585.1:6 A.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